The Role of Fish and Game in New Zealand: Environmental Management

Corina Jordan

Environment Manager Fish & Game New Zealand

Fish & Game

Fish & Game NZ is a statutory body established under the Conservation Act (1987):

"to manage, maintain, and enhance the sports fish and game bird resource in the recreational interests of anglers and hunters" (s26 (a));

"*to assess and monitor the condition and trend of ecosystems as habitats for sports fish, and game*" (s26 (b)); and

"*to represent the interests and aspirations of anglers and hunters in the statutory planning process*" (s26(c)).

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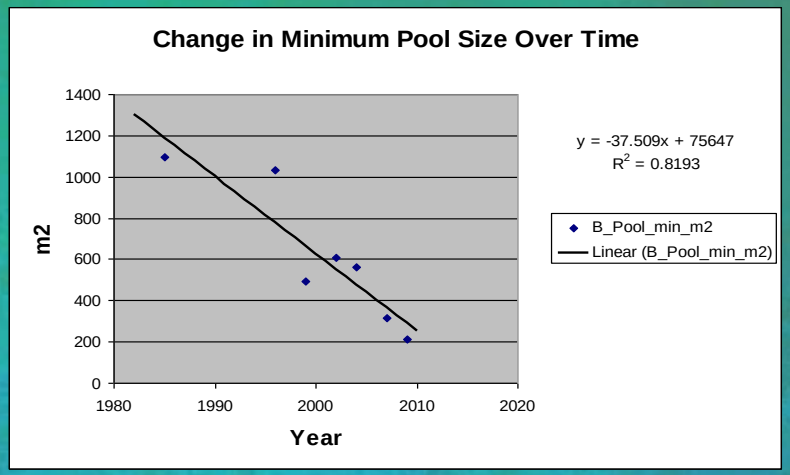
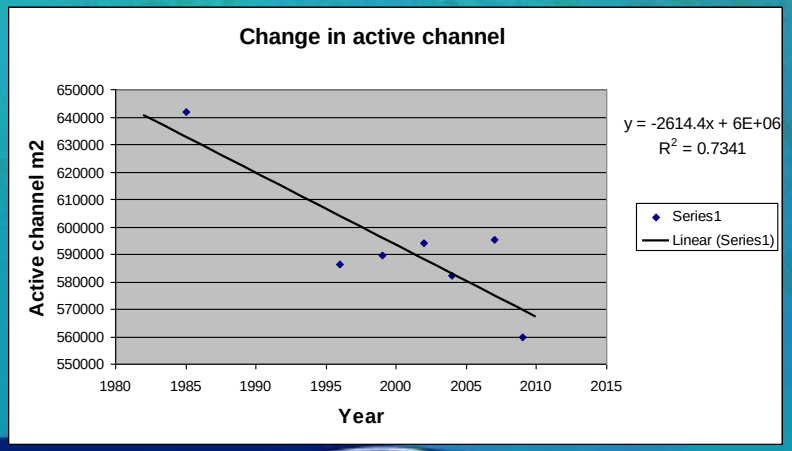
Freshwater Ecologist

The fun stuff

Research

Geomorphological analysis





33% reduction in active channel

80% reduction in minimum pool size

No significant difference in wetted channel

Population and habitat changes

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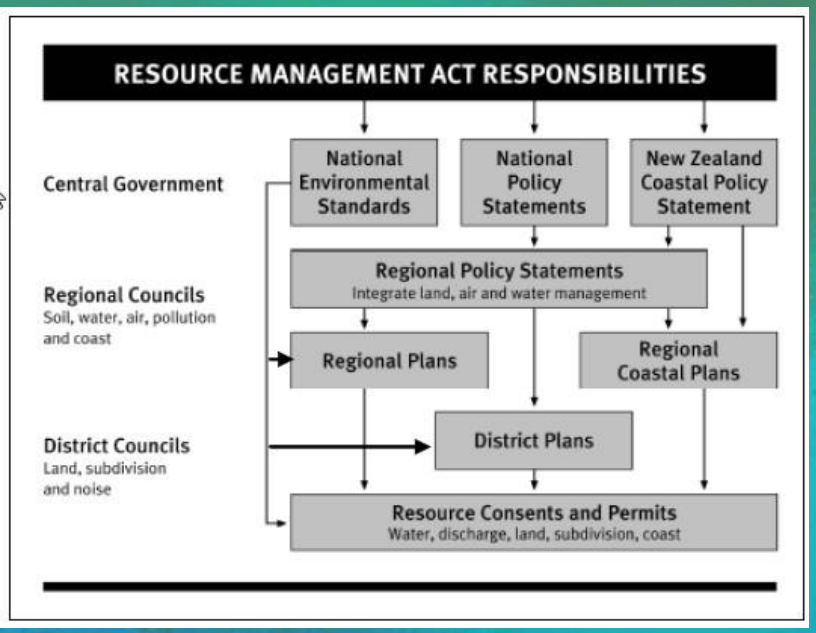
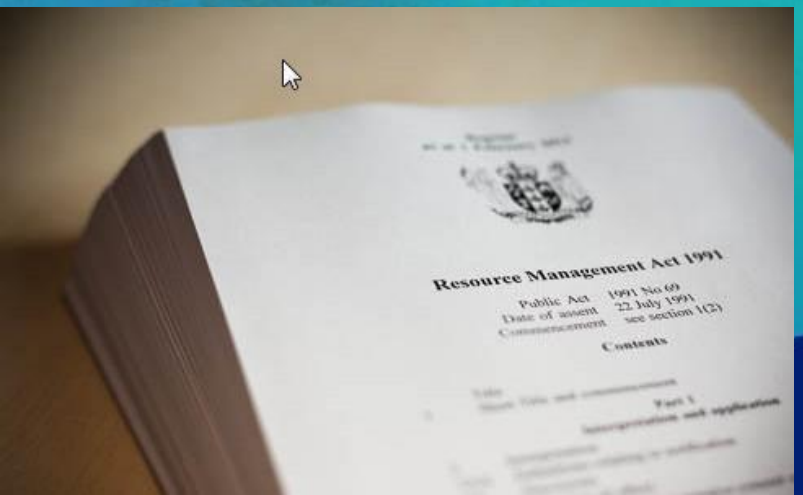
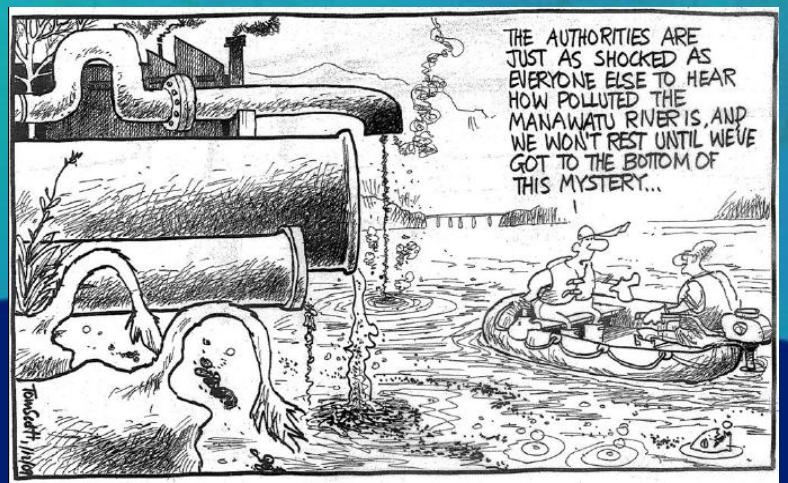
NRM Planning

The hard stuff



- **Work with Regional Councils to develop Regional Policy Statements and Plans**
- **Run cases through Regional Hearings, Environment Court, Board of Inquiry, and Environment Canterbury Commissioners**
- **Work with Regional Councils on ensuring compliance with plan rules**
- **Submit on resource consents**
- **Submit on National legislation**





Why has Fish and Game been Involved?

Promote integrated catchment of land and water resources to ensure the sustainable management of freshwater to provide for healthy ecosystems and recreational and amenity values

Recognition and protection of salmonid fishery and recreational values

Establishment of water quality and quantity limits which safeguards Life Supporting Capacity (LSC) and Ecosystem Health, and protect the habitat of trout and salmon

Identification of over allocated catchments

Adoption of land and water management approaches that are integrated, sustainable, and ensures that:

- where limits are met they continue to be met; and
- where resources are over allocated that land management

  improves so as to improve the health of freshwater environments over time

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Freshwater Resources

Freshwater related issues are the single biggest environmental concern for New Zealanders (Hughey *et al*, 2010)

Many of New Zealand's rivers, lakes and estuaries are in a degraded state, restricting their ecosystems and the services they provide for society - abundant fish, desirable places for recreation, safe drinking water for humans and livestock (NIWA)

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Environmental Drivers of Decline in Freshwater Ecological Health

Rivers and their biological communities are subject to a wide array of environmental stress from increasing anthropogenic activities.

- Changes in hydrology
- Changes in geomorphology
- Loss of riparian habitats
- Enrichment
- Sedimentation

As a result freshwater ecosystems are impacted and the fisheries heavily modified or degraded

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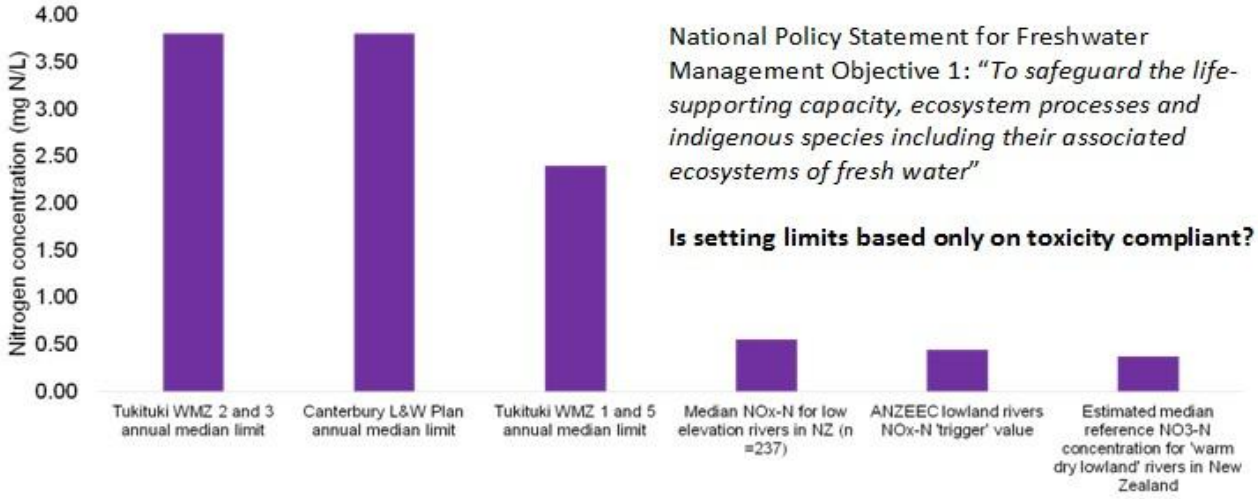
Causes of decline in Freshwater Ecosystem Health

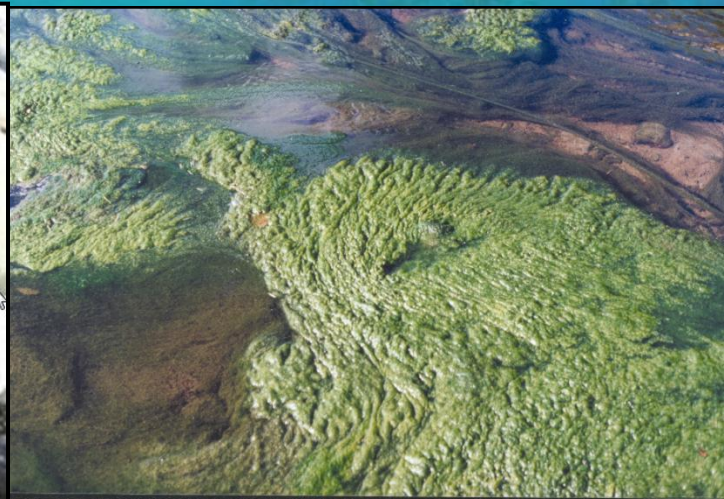
Increasing nutrient levels

How much environmental protection does setting nitrogen limits only based on toxicity really offer?

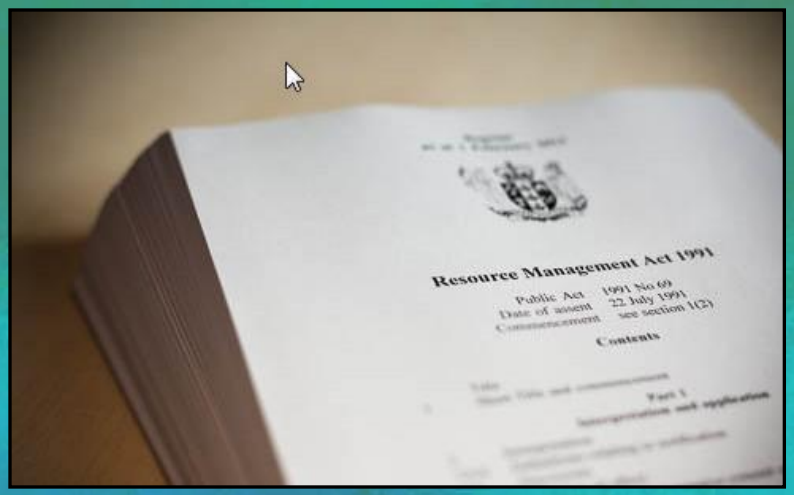


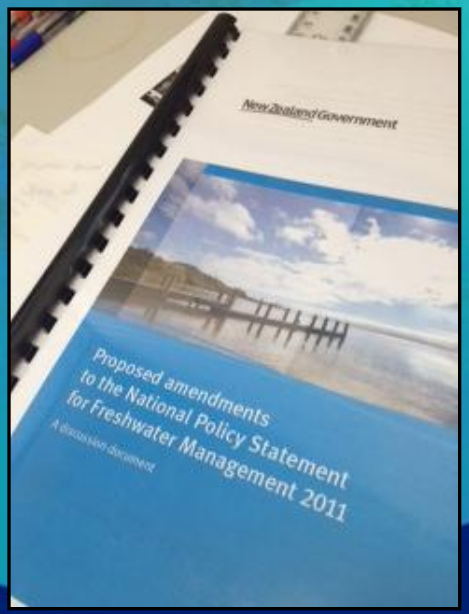
National Policy Statement for Freshwater Management Objective 1: "*To safeguard the life-supporting capacity, ecosystem processes and indigenous species including their associated ecosystems of fresh water*"

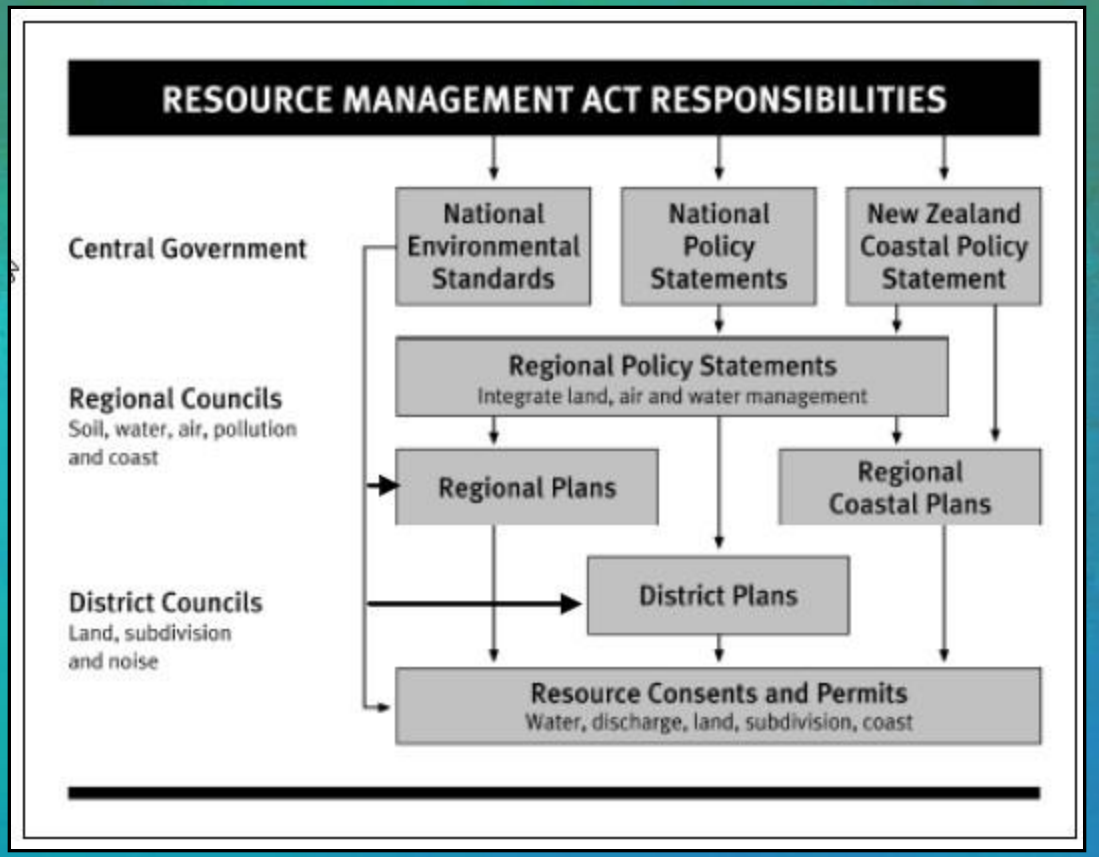
Is setting limits based only on toxicity compliant?



Legislation







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RMA 1991

Under part 2 of the Resource Management Act 1991 Regional Councils need to ensure resource are sustainably managed

The purpose of this Act is to promote the sustainable management of natural and physical resources

In this Act, sustainable management means managing the use, development, and protection of natural …resources.. While..
(b) Safeguarding the life supporting capacity of air, water, soil, and ecosystems

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RMA 1991

Under part 2 of the Resource Management Act 1991 Regional Councils need to recognise and provide for:

as a "*matter of national importance*" the preservation of the Natural Character of wetlands, and lakes and rivers and their margins (s6), and

"*have particular regard to*" the maintenance and enhancement of: amenity values (s7c); Intrinsic values of ecosystems (s7d); Maintenance and enhancement of the quality of the environment (s7f); the protection of the habitat of trout and salmon (s7h)

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s30 RMA
Function of Regional Councils

s 30 Every regional council shall have the following functions for the purpose of giving effect to this Act in its region:

a) the establishment, implementation, and review of objectives, policies, and methods to achieve integrated management of the natural and physical resources of the region:

b) the preparation of objectives and policies in relation to any actual or potential effects of the use, development, or protection of land …..:

c) the control of the use of land for the purpose of—

(i) soil conservation:

(ii) the maintenance and enhancement of the quality of water in water bodies and coastal water:

(iii) the maintenance of the quantity of water in water bodies and coastal water:

(iiia) the maintenance and enhancement of ecosystems in water bodies and coastal water…

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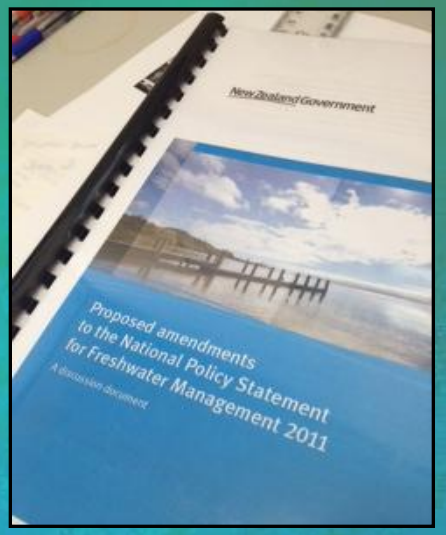
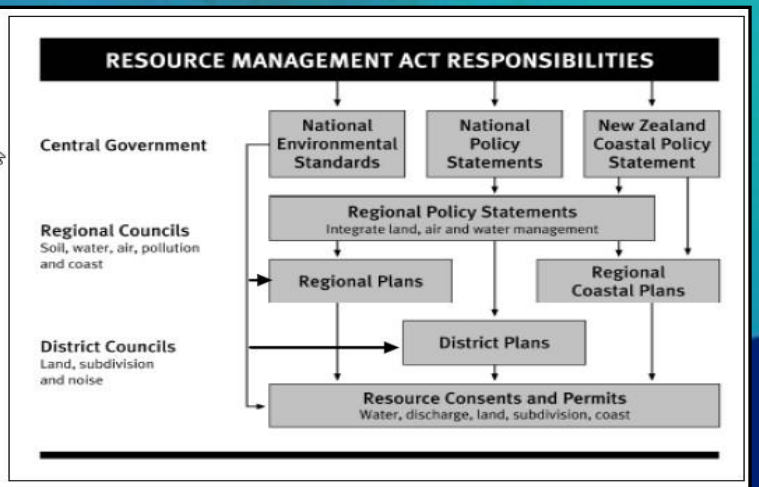
National Policy Statement on Freshwater

Objective A1: To safeguard the life supporting capacity, ecosystem processes and indigenous species including their associated ecosystems of freshwater in sustainably managing the use and development of land and of discharges of contaminants



Objective A2 (c): Improving the quality of freshwater that has been degraded by human activities to the point of over allocation



Policy A1: Every Regional Council to establish freshwater objectives and set freshwater quality limits for all bodies of freshwater in their region

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Promotion of Sustainable Management of Freshwater Resources

Horizons One Plan

- Commissioners hearing
- Environment Court
- Joined primary industries appeal to High Court on points of law

Canterbury Regional Council Land and Water Regional Plan

- Commissioners Hearing
- Appealed to High Court on points of Law

Hawkes Bay Tukituki Plan change 6 & RWSS

- Board of Inquiry hearings
- High Court Appeal on points of law

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HORIZONS ONE PLAN

Endorsed by the courts

Values of waterbodies should be identified and then limits should be set to protect the most stringent value

Water quality and quantity should be maintained where it meets the limit and improved where it is more degraded than the limit

Natural Character of rivers as a matter of national importance should be protected (s6 of the Act), this includes water quality and quantity

No existing use rights in regards to land use activities where these are likely to impact on freshwater resources – meaning that land use can and should be regulated

Regulation should underpin sustainable land use and water management – voluntary approach is not enough

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Step 1: Identify values

Legend:
Table Headings: **LSC**: Life-supporting Capacity; **AE**: Aesthetics; **CR**: Contact Recreation; **Mau**: Mauri; **IA**: Industrial Abstraction; **I**: Irrigation; **SW**: Stockwater; **EI**: Existing *Infrastructure*^; **CAP**: Capacity to As
Pollution; **NS**: Natural State; **SOS-A**: Sites of Significance - Aquatic; **SOS-R**: Sites of Significance - Riparian; **IS**: Inanga Spawning; **AM**: Amenity; **WM**: *Whitebait** migration; **SOS-C**: Sites of Significance - Cultural; **T**
Fishery; **TS**: Trout Spawning; **WS**: Water Supply; **DFS**: Domestic Food Supply; **FC/D**: Flood Control and Drainage.

Key for LSC Classes: **UHS:** Upland Hard Sedimentary, **UVA:** Upland Volcanic Acidic, **UVM:** Upland Volcanic Mixed, **ULi:** Upland Limestone, **HM:** Hill Mixed, **HSS:** Hill Soft Sedimentary, **LM:** Lowland Mixed, **LS:** L
Sand. The LSC Classes are listed as the geology of the catchment influences water quality and life-supporting capacity

Key for Fishery Classes: **I:** Outstanding, **II:** Regionally Significant, **III:** Other Trout Fishery

Table B.1: Surface *Water*^ Management Values by *Sub-zone

*Water Management Zone**	*Sub-zone**	*Sub-zone** Description[1]	Zone-wide Values											Site/Reach-specific Values								
			LSC	AE	CR	Mau	IA[2]	I[2]	SW	EI	CAP[3]	NS	SOS-A	SOS-R	IS	AM	WM	SOS-C	TF	TS	WS	DFS
Upper Manawatu (Mana_1)	Upper Manawatu (Mana_1a)	Manawatu River from Weber Road at approx. NZMS 260 U23:751-027 to source	HM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓			II	✓		
	Mangatewainui (Mana_1b)	Mangatewainui River from Manawatu River confluence at approx. NZMS 260 U23:829-086 to source	HM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						II	✓		
	Mangatoro (Mana_1c)	Mangatoro Stream from Manawatu River confluence at approx. NZMS 260 U23:810-027 to source	HSS	✓	✓	✓	✓	✓	✓	✓	✓	✓							II	✓		
Weber-Tamaki (Mana_2)	Weber-Tamaki (Mana_2a)	Manawatu River from Tamaki River confluence at approx. NZMS 260 U23:709-003 to Weber Road at approx. NZMS 260 U23:751-027	HM	✓	✓	✓	✓	✓	✓	✓	✓			✓					II			
	Mangatera (Mana_2b)	Mangatera Stream from Manawatu River confluence at approx. NZMS 260 U23:737-025 to source	HM	✓	✓	✓	✓	✓	✓	✓	✓									✓		

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Step 2: Set WQ Limits
Step 3: Manage to Limits

Table E.1: Region-wide *Water Quality Targets (or standards where specified under conditions/standards/terms in a rule) that apply to all *Rivers^***

*Water Management Zone**	*Sub-zone**	*E.coli* / 100 ml		Periphyton Filamentous Cover	Diatom or Cyanobacterial Cover	QMCI %Δ[1]
		< 50th %ile	< 20th%ile			
All *Water Management Zones**	All *Water Management Sub-zones**	260	550	30%	60%	20

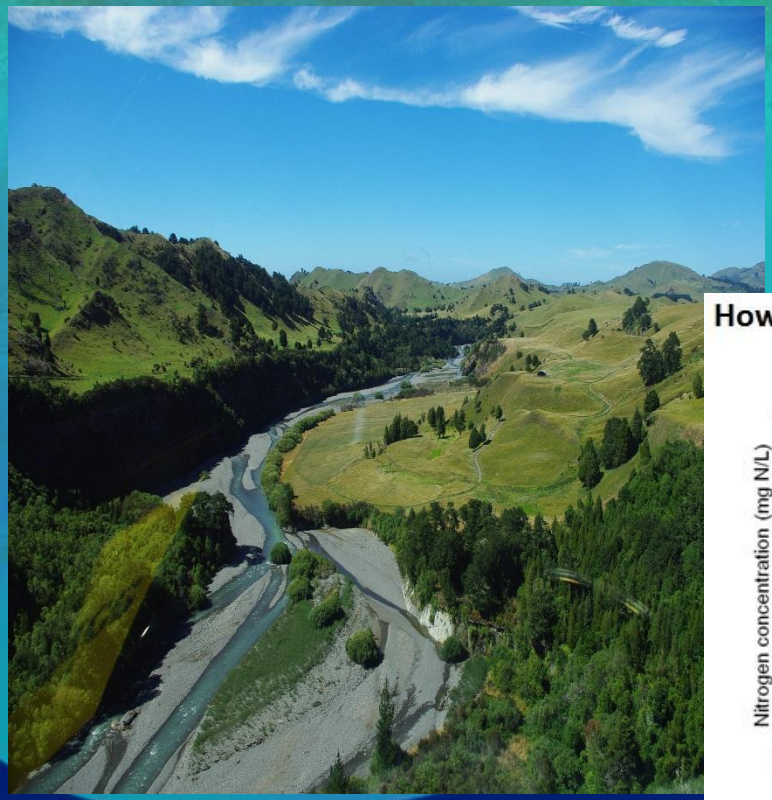
*Water Management Zone**	*Sub-zone**	pH		Temp (°C)		DO (%SAT)	scBOD$_5$ (g/m^3)	POM (g/m^3)	Periphyton	DRP (g/m^3)	SIN (g/m^3)	Deposited Sediment Cover (%)[2]	MCI	Ammoniacal Nitrogen (g/m^3)		Tox.	Visual Clarity (m)	
		Range	Δ	<	Δ	>	<	<	Chla (mg/m^2)	<	<	≤	>	<	Max	%	< 50th %ile	%Δ
Upper Manawatu (Mana_1)	Upper Manawatu (Mana_1a)	7 to 8.5	0.5	19	3	80	1.5	5	120	0.010	0.167	20	120	0.400	2.1	99	3	20
	Mangatewainui (Mana_1b)	7 to 8.5	0.5	19	3	80	1.5	5	120	0.010	0.167	20	120	0.400	2.1	99	3	20
	Mangatoro (Mana_1c)	7 to 8.5	0.5	19	3	80	1.5	5	120	0.010	0.110	20	120	0.400	2.1	99	3	20
Weber-Tamaki (Mana_2)	Weber-Tamaki (Mana_2a)	7 to 8.5	0.5	19	2	80	1.5											
	Mangatera (Mana_2b)	7 to 8.5	0.5	22	3	70	2											
Upper Tamaki (Mana_3)	Upper Tamaki (Mana_3)	7 to 8.2	0.5	19	2	80	1.5											
Upper Kumeti (Mana_4)	Upper Kumeti (Mana_4)	7 to 8.2	0.5	19	2	80	1.5											

Period	*LUC** I	*LUC** II	*LUC** III	*LUC** IV	*LUC** V	*LUC** VI	*LUC** VII	*LUC** VIII
Year 1	30	27	24	18	16	15	8	2
Year 5	27	25	21	16	13	10	6	2
Year 10	26	22	19	14	13	10	6	2
Year 20	25	21	18	13	12	10	6	2

Ruataniwha Irrigation Project

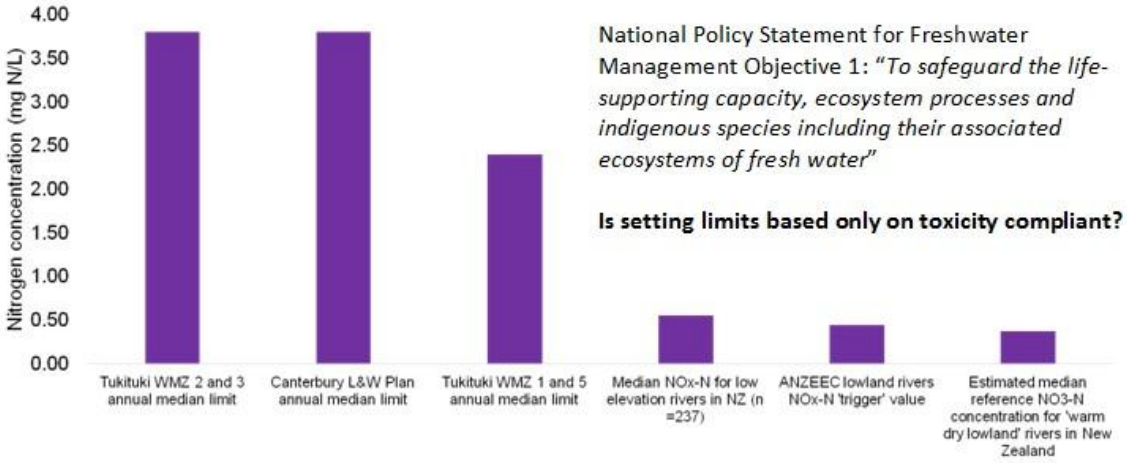
83m Dam with reservoir of 370ha, 90million m3 storage

Plan to irrigate 25,000ha land. Currently 6000ha irrigated



Create a regional plan (PC6) to facilitate consents

How much environmental protection does setting nitrogen limits only based on toxicity really offer?



National Policy Statement for Freshwater Management Objective 1: "*To safeguard the life-supporting capacity, ecosystem processes and indigenous species including their associated ecosystems of fresh water*"

Is setting limits based only on toxicity compliant?

Ruataniwha Irrigation Project & Tukituki Catchment Plan

Plan Change 6 HBRC proposed N toxicity limits

	Annual median	95th percentile
Zone 4 (headwaters)	0.150mg/L	1.5mg/L
Zone 1	2.4mg/L	3.5mg/L
Zone 2	3.8mg/L	5.6mg/L
Zone 3	3.8mg/L	5.6mg/L

Median N concentrations for each zone and percentage increase allowable

	Current Annual median	Percentage change allowable under PC6
Zone 4	0.226mg/L	- 40%
Zone 1	0.608mg/L	+ 119%
Zone 2	0.926mg/L	+ 121%
Zone 3	1.15mg/L	+ 107%

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BOI Decision

Board rejected single nutrient management approach in favor of duel nitrogen and phosphorus management and the establishment of limits for ecosystem health and not toxicity

Dissolved inorganic limits as a maximum is set at 0.15mg/L for headwater catchment and 0.8mg/L for middle and lower catchments.

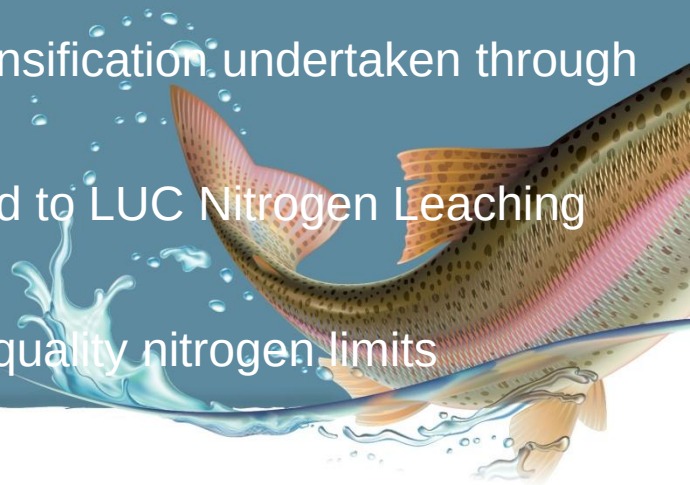
Water quality will therefore have to be managed for improvement

Water bodies are to be managed for primary contact recreation

Rules and consent conditions ensure land use and intensification undertaken through the scheme is environmentally sustainable

Land is managed using best management practices and to LUC Nitrogen Leaching standards

Agriculture is managed through rules to achieve water quality nitrogen limits



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DUEL NUTRIENT MANAGEMENT
Essential for sustainable management

Nutrient management efforts have focused on controlling a single limiting nutrient (i.e., N or P) based on a paradigm that assumes primary production is N-limited in marine waters and P-limited in freshwaters.

In practice, however, there are scientific reasons that make this an overly simplistic model for management of nutrient pollution

- Limitation state changes spatially and temporally even in the same catchment
- Co limitation is commonly observed across FW and marine environments
- P can be stored in sediments and released for plant growth (legacy effects)
- Composition of Algal communities change in response to changes in N and P
- Low P higher N have been linked to increasing cyanobacteria blooms
- Algal cells can recycle P

Because of the highly variable nature of nutrient limitation in aquatic systems, numeric criteria for both N and P provide the greatest likelihood of protecting aquatic systems.

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CONCLUSIONS

Duel nutrient management: essential for sustainable FW management

Nutrient pollution resulting from excess nitrogen (N) and phosphorus (P) is a leading cause of degradation of water quality.

The scientific literature provides many examples that illustrate the effects of both N and P on instream and downstream water quality in streams, lakes, estuaries, and coastal systems.

Development of numeric nutrient criteria for both N and P to ecological health limits (not toxicity) is an essential tool in the sustainable management of freshwater resources in New Zealand.

EPA United States Environmental Protection Agency | Office of Water | EPA - 820-S-15-001 | MC 4304T | February 2015

Preventing Eutrophication: Scientific Support for Dual Nutrient Criteria

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NIWA

THE UNIVERSITY OF WAIKATO

Nutrient-limitation in New Zealand rivers, lakes and estuaries: a discussion document

Paper prepared for Land and Water Forum, September 2011

Scott Larned[1], David Hamilton[2], Clive Howard-Williams[1], John Zeldis[1]

CONCLUSIONS

Establishment of output based standards which deliver on FW outcomes are essential for the Sustainable Management of Primary Production Land Uses

Application of nitrogen leaching standards which relate to an environmental outcome are an essential component of any primary production land use management framework, along with application of GMP which contain clear, measureable, and enforceable standards.

BOI quote “The Board acknowledges the concerns expressed in Day and agrees that industry good management practices determined by the industry itself cannot form part of an enforceable regulatory approach”….. Put another way, it is an *aspirational policy and in that sense it provides a useful consideration when it comes to formulating FEMPs…” [BOI para 400]*

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